Space Weather Forecast

Issued on Wednesday, 15 March 2023 at 13:34 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate Geomagnetic storms and chance of a G3/Major Geomagnetic storm due to combined effects of possible further glancing Coronal Mass Ejections on Days 1-2 (15-16 March). S1/Minor Radiation storm expected on day 1 (15th).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low or Very Low in the past 24 hours with isolated Common-class flares. There are currently nine sunspot regions currently on the Earth-facing disc. These are a mixture of small, mature spots with a couple of small but emergent/developing regions. All spots however, have remained relatively simple.
No Earth directed CME's have been observed in the past 24 hours.

Solar Wind / Geomagnetic Activity: Solar wind increases reflected the arrival of a coronal mass ejection around 15/0350UTC, with speeds observed rising sharply to Elevated levels. Winds have since gradually declined to Slightly Elevated levels. The magnetic field strength was weak to moderate, increasing sharply around 15/0400UTC to strong before returning to moderate. The important north-south component was variable but often southward until 15/0400UTC when it has bee predominantly northward. Geomagnetic activity was Unsettled to Active (Kp 3-4), with a G1/Minor Storm interval observed).
Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) rose above the S1 level, likely due to the ongoing effects from the significant far-sided eruption early on 13 Mar, with a peak of 22pfu at 15/0425UTC. Levels dropped below the S1 threshold around 15/0600UTC and have since been on a downward trajectory.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to continue Low or Very Low, with a slight chance of an isolated Moderate-class flare.
Solar Wind / Geomagnetic Activity: Further glancing coronal mass ejection impacts are possible Days 1-2 (15-16 Mar), due to filament eruptions that occurred 10-13 March. These are all low confidence, however any combined effect could give a larger geomagnetic response than normally expected from such glancing impacts. Solar winds are expected to remain at or close to elevated levels throughout Days 1-2 with additional weak enhancement possible from the arrival of a fast winds from a coronal hole on Day 1, winds then expected to decline but remain at slightly elevated levels. Geomagnetic activity will initially fluctuate between Unsettled to Active, with the combined influence of CME and HSS expected to bring G1/G2 Minor/Moderate geomagnetic storms and a chance of a G3/Strong storm interval on Days 1-2. Activity easing to mainly Quiet by 17 March.
Energetic Particles / Solar Radiation: The count rate of energetic particles is currently below S1/Minor storm levels and is expected to remain at background levels, however, there remains a slight chance of exceeding the threshold through the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	80	30	1	1
Strong	G3	No	30	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	5	5	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	20	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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